Ch 6 (Extra)
Sum and Product of Roots;
Writing Equations when given the roots

Given the solution set, write the equation.

ex 1:
{-5, 3}

$(x+5)(x-3)=0$

$x^2+2x-15=0$

sum = -2
product = -15

$x^2-(\text{sum})x+(\text{product})=0$

ex 2:
{4, 6}

$x^2-10x+24=0$

sum = 10
prod = 24

$x^2 - (\text{sum})x + \text{product} = 0$

Given the solution set, write the equation.

ex 3:
{-.5, 4}

$2\left(x^2-3\frac{1}{2}x-2=0\right)$

$2x^2-7x-4=0$

sum = $3\frac{1}{2}$
product = -2

Create a common denominator or:

$ax^2 + bx + c = 0$ (Factor out a)

$a\left(x^2+\frac{b}{a}x+\frac{c}{a}\right)=0$

product = $\frac{c}{a}$
sum = $-\frac{b}{a}$

$x^2 - (\text{sum})x + \text{product} = 0$

$\text{sum} = \frac{-b}{a}$

$\text{product} = \frac{c}{a}$

Write the equation given the roots:

ex 4:
$\{-\frac{1}{2}, \frac{3}{4}\}$

$x^2 - \text{sum}\,x + \text{product} = 0$

Sum $= \frac{1}{4} = \frac{2}{8}$

$x^2 - \frac{1}{4}x - \frac{3}{8} = 0$

Product $= -\frac{3}{8}$

$8x^2 - 2x - 3 = 0$

$a = 8$
$b = -2$
$c = -3$

Write the equation given the roots:

ex 5:
$\left\{\frac{2 \pm i}{3}\right\}$

$\left\{\frac{2+i}{3}, \frac{2-i}{3}\right\}$

Sum $= \frac{4}{3}$

Product $= \frac{(2+i)}{3}\cdot\frac{(2-i)}{3} = \frac{5}{9}$

$9x^2 - 12x + 5 = 0$

Find k such that
$4x^2 + kx - 15 = 0$
has a root of $\frac{3}{4}$

⇒ Write 2 equ. using Sum + product

$\{\frac{3}{4}, r\}$

Sum $= \frac{-b}{a}$

$\frac{3}{4} + r = \frac{-k}{4}$

Product $= \frac{c}{a}$

$\frac{3}{4}r = \frac{-15}{4}$

$r = -5$

$\frac{3}{4} + \frac{-20}{4} = \frac{-k}{4}$

$-17 = -k$

$17 = k$

Find k such that
$x^2 - 2x + k = 0$ has
a root of $1 - \sqrt{7}$

$\{1 - \sqrt{7}, r\}$

Sum $= \frac{-b}{a}$

$1 - \sqrt{7} + r = 2$

$r = 1 + \sqrt{7}$

Product $= \frac{c}{a}$

$(1 - \sqrt{7})(1 + \sqrt{7}) = k$

$1 - 7$

$-6 = k$

Also a good check.
Solve.
$x^2 + 5x - 24 = 0$

-24
5

$(x + 8)(x - 3) = 0$

$\{-8, 3\}$

Sum -5 ✓
prod -24 ✓

HW
worksheet #s 9-19odd, 16, 20